International Journal of Ecology and Environmental Sciences 47(1): 37-42, 2021
ISSN: 2320-5199 (Online)

Temporal distribution of Sarus Crane (*Grus antigone)* in Dhanauri wetland, Gautam Buddh Nagar, Uttar Pradesh, India

HARSH GULATI[1] AND SARITA RANA[2]

[1]*Department of Zoology, Kurukshetra University, Kurukshetra, Haryana 136119, India*
[2]*Department of Zoology, Institute of Integrated and Honours Studies, Kurukshetra University, Kurukshetra, Haryana 136119, India*
E-mail: [1]harshmagic23@gmail.com, [2]saritarana20@gmail.com

ABSTRACT

The Sarus Crane (*Grus antigone*) is the tallest flying bird. Due to their decreasing population trend, the Sarus crane has been recognized as "vulnerable" in the IUCN Red List of Threatened Species. The present study was conducted in Dhanauri wetland, Uttar Pradesh to collect the information about the distribution of Sarus Crane and proposing steps to protect their habitat through a continuous population census with the aid of residents, farmers, and the state administration. It has found to be an excellent site for conservation, as it is surrounded by paddy fields and somehow not subjected to the burden of urbanization. The study area was categorised into three transects (T1, T2 and T3) depending on the immenseness, abundance, and Sarus inhabiting areas. A total of 332 individuals of Sarus Crane was observed. Out of these we recorded a maximum number of Sarus cranes (152) in agricultural land (Transect 2) followed by marshland (Transect 3) where 122 individuals of Sarus Cranes were observed, while it was minimum (58) in Transect 1 that consisted of the littoral zone. It is, therefore, necessary to protect such wetland habitats, to provide a healthy ecosystem for Sarus Cranes as well as other organisms. Through the findings of this study, we conclude that the regular monitoring of the Sarus Crane's natural habitat with associated distribution and other biological parameters (food, water and space) necessary for its survival would pave the way towards an effective conservation strategy.

Keywords: Sarus crane, Distribution, Conservation, Dhanauri wetland, Uttar Pradesh

INTRODUCTION

The Sarus Crane is one of the world's fifteen known crane species and is the only resident breeding crane found in India and South-eastern Asia (Ansari 2015). Sarus Crane is Uttar Pradesh's state bird and inhabits a large and diverse wetland scattered in the agricultural landscapes of the state (Jha 2013). Due to its declining population trend Sarus crane has been documented as "vulnerable species" in the IUCN Red List of Threatened species (BirdLife International 2016). Prior knowledge of the spatial distribution of the species is important for their management and conservation (Morris 2003, Klar et al. 2008). Effective conservation of threatened species, in particular, requires a better understanding of habitat and frequency of use and their relation to populations (Block and Brennan 1993, Jones 2001). The distribution can also help to identify high-priority protection areas and exemplify the essential management of habitats (Canadas et al. 2005). Wetlands are often recognized as the most biologically diverse ecosystem and homes to a variety of flora and fauna. As wetlands have various hydrological roles such as flood-peak reduction, shoreline stabilization, recharging of groundwater, and water quality improvements, all of which are considered as a significant system that offers enormous benefits to society (Andy and Mike 2003). The present study was carried out to assemble the primary information on the spatial and temporal distribution of Sarus Crane in Gautam Buddh Nagar district of Uttar Pradesh as an effective strategy for their conservation and management.

STUDY AREA

The study was conducted from August 2018 to December 2019 in Dhanauri Wetland (28° 202' N and 77° 372' E), covering an area of 40 ha, and

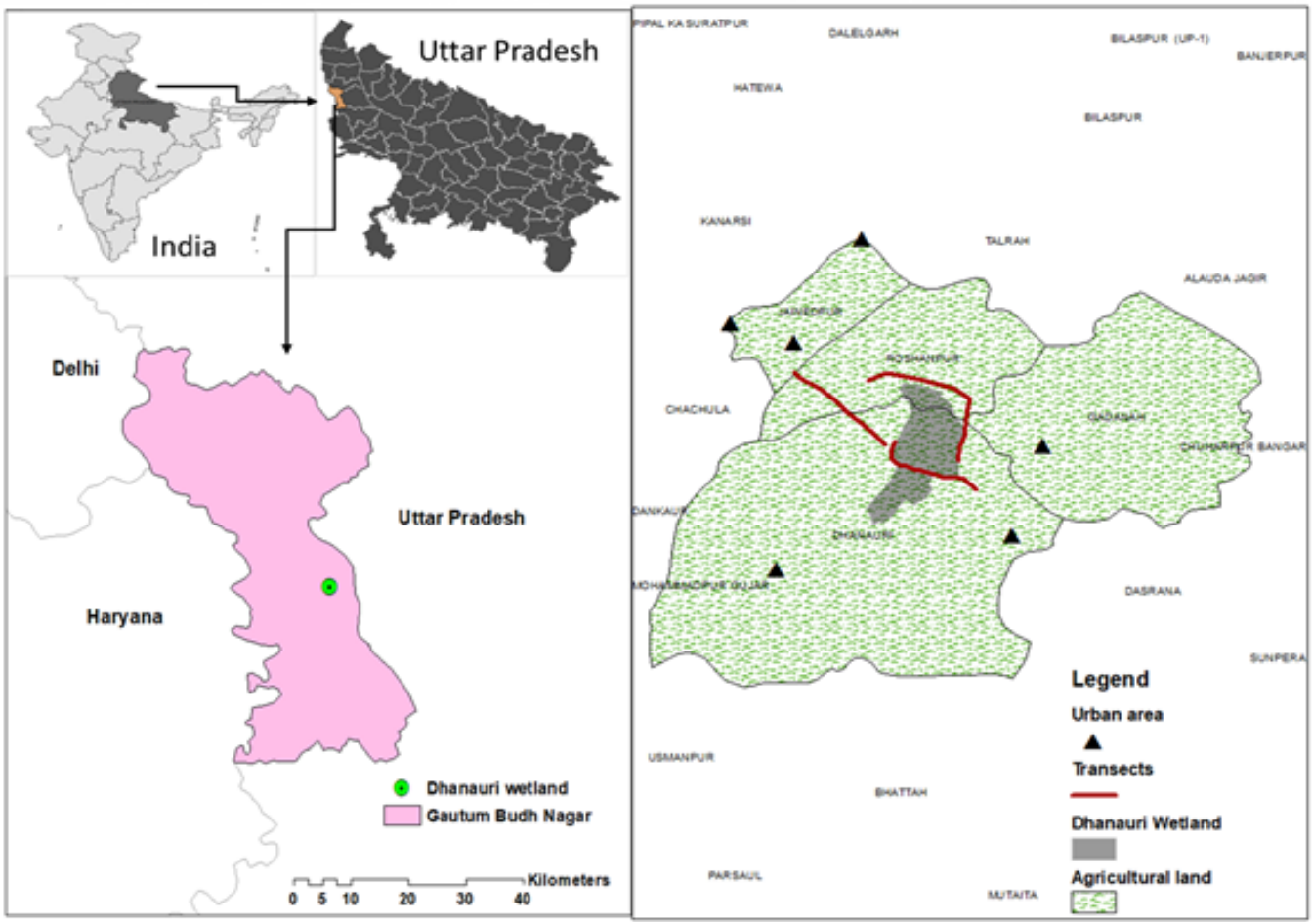

Figure 1. Study area map showing Dhanauri wetland (light gray polygon) in Gautum Budh Nagar district, Noida, Uttar Pradesh

located in village Thasrana of Gautum Budh Nagar district in Uttar Pradesh (Figure 1). The study area was spatially categorised into three transects (varied from 1-2 km) depend on the immenseness, abundance, and inhabiting areas of Sarus Crane (Figure 2). The state has a subtropical climate with four distinct season. Winter season occur between the month of November to January; Spring season occurs from February to April; summer season approaches in the month of may to July and autumn commences in august and ends in late October.

MATERIAL AND METHODS

The study was conducted from August 2018 to December 2019. Population of Sarus Crane were recorded by direct observations of the species in the respective study area. All efforts have been done by walking through cultivated (Paddy and wheat crops) and uncultivated land. In addition to the actual sightings, consultation with the local people during every field visit regarding the Sarus Crane population were also taken into consideration to enhance the authenticity of data. Surveys were carried out in morning hours (07:00 – 10:00 hour) and evening hours (14:00 – 17:00 hour). SPSS ver. 26 was used for the statistical analysis of data.

RESULTS

Sarus Crane has been observed in all three laid transects in our study site. A total of 332 cranes had been sighted, but the local population believed there would be additional cranes. Cropland vegetation was abundant in Transect 2 (Figures 3 and 4) with some anthropogenic activities, while Transect 3 mostly included marshland (Figure 5) with a little agricultural area, which covers the maximum area of wetland. Transect 1 primarily covered the wetland coastal zone with increasing vegetation, which

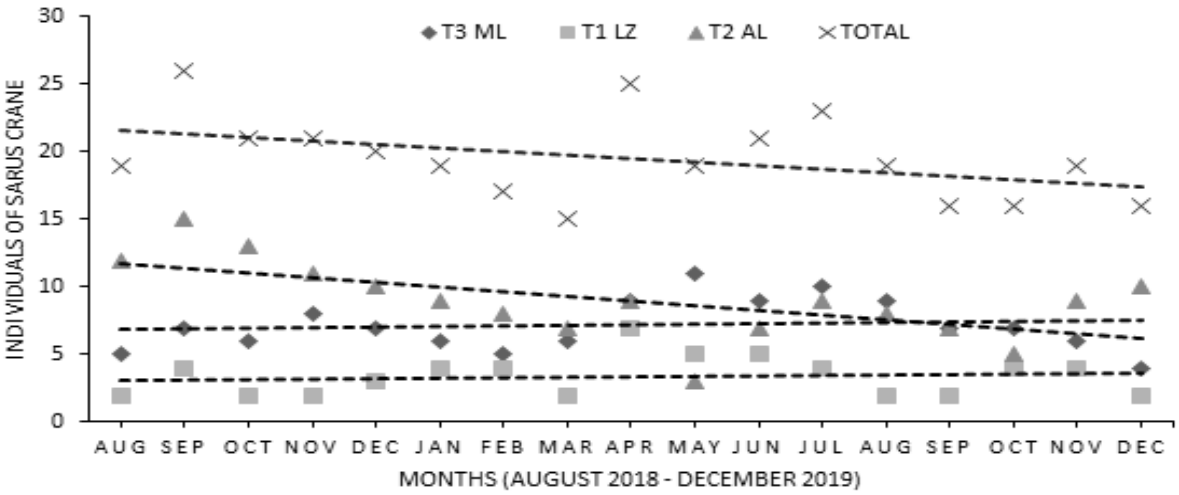

Figure 2. Scatter plot with the linear line, showing the distribution of Sarus Crane in the study area of Transect 1, 2 and 3

Figure 3. Sarus Crane foraging in agricultural land (Transect 2)

Figure 5. Congregation of Sarus Crane in Dhanauri wetland (Transect 3)

Figure 4. Adult Sarus Crane with their Juvenile in Agricultural land (Transect 2)

Figure 6. Pair of Sarus Crane sighted on Transect 1

remains firmly rooted in the shoreline substratum (Figure 6). During observation, we recorded the highest (152) population of Sarus Crane in Transect 2. However, 122 individuals of Sarus Cranes were observed in marshland habitat (Transect 3) while it was minimum (58) in Transect 1 i.e., littoral zone. In the course of the study, up to 58 individuals of Sarus Cranes were found along the roadside transect of the wetland (Table1). This is largely owing to the fact that this site provides a vast expense of shallow water.

Seasonal Variation in the distribution pattern of Sarus Crane has also been recorded (Table 1, 2). The large number of Sarus Cranes were recorded during the summer season as compared to winter season, which suggest the availability of food to other locations leads to local migration during winter season. By the time of summer and autumn these birds established their territories and were likely to breed. However, their relative abundance was found to be varied among three transects as shown in Tables 1 and 2. During observation maximum number of cranes (15) were observed in September along transect 2 while it was minimum in the month of august i.e only 2 individuals of Sarus Cranes were observed along transect 1 (Table 2). However the range of the individuals were significantly varied among three different transects as shown in Table 2.

Table 1. The month-wise distribution of Sarus Crane and their mean numbers in the respective transects of the Dhanauri wetland

MONTHS	T1	T2	T3	TOTAL	MEAN±S.D
			2018		
AUG	2	12	5	19	6.33±5.13
SEP	4	15	7	26	8.66±5.68
OCT	2	13	6	21	7.00±5.56
NOV	2	11	8	21	7.00±4.58
DEC	3	10	7	20	6.66±3.51
			2019		
JAN	4	9	6	19	6.33±2.51
FEB	4	8	5	17	5.66±2.08
MAR	2	7	6	15	5.00±2.64
APR	7	9	9	25	8.33±1.15
MAY	5	3	11	19	6.33±4.16
JUN	5	7	9	21	7.00±2.00
JUL	4	9	10	23	7.66±3.21
AUG	2	8	9	19	6.33±3.78
SEP	2	7	7	16	5.33±2.88
OCT	4	5	7	16	5.33±1.52
NOV	4	9	6	19	6.33±2.51
DEC	2	10	4	16	5.33±4.16
TOTAL	**58**	**152**	**122**	**332**	

DISCUSSION

The agricultural land around the Dhanauri wetland is also important for Sarus Crane as it frequently uses them to foraging, nest building and breeding. The present investigation showed that Transect 1 holds fewer individuals (58) as compared to Transect 1 and 2, this may be due to some anthropogenic activities. Besides, the number of cranes decreased during the summer months (high temperatures) in the study site over the wet season, as the food shortage causes them to shift and seeking better zones for feeding. Paddy fields were also considered to be beneficial to these species (Borad et al. 2004, Sundar and Subramanya 2010). The agricultural landscape was found to be the safest for Sarus Crane to build their nest (Borad et al. 2003). Our results suggest that Sarus cranes inhabit agricultural land, because of the suitability of the habitat. Sarus cranes prefer agricultural land for feeding and wetlands for roosting (Aryal et al. 2009). In the course of a population census, we also found that the presence of flooded paddy fields or irrigated soil was not the only factor deciding Sarus Crane distribution but also influenced the availability of cranes due to vegetation on the edge (as on

Table 2. Descriptive statistics on the variation of the Sarus Crane population in Dhanauri wetland from August 2018 to Dec 2019

	Transect 1	Transect 2	Transect 3
Minimum	2	3	4
Maximum	7	15	11
Range	5	12	7
Sum	58	152	122
Median	4	9	7
Mean	3.41	8.94	7.17
Std. Error	0.35	0.69	0.46
Std. dev	1.46	2.88	1.91
Skewness	0.81	0.10	0.38
Kurtosis	0.49	0.64	-0.48
Coef. of Variance	0.42	0.32	0.26

Transect 1) of the cultivated field and crop type. Paddy fields with highly irrigated soil served as a temporary wetland to provide the Sarus Crane with an alternative habitat. The direct encouragements to conserve biodiversity as an efficient tool in the delivery of conservation results in a way that also offers developmental benefits to local people (Sundar 2011). The Sarus Crane, which is Uttar Pradesh's pride, could be saved effectively by similar strategies in the region. Authors suggest conserving regular monitoring of the biological parameters (food, water and space) and record the changes if any, should help to maintain the natural vibrancy of the valuable natural assets of wetlands in Uttar Pradesh. At the grass-root level, village-based education programs and other local developmental programs should be helpful in creating an ambiance for improving the situation (Meine and Archibald 1996).

CONCLUSIONS

Wetlands are more crucial economic resources when maintained in a natural or semi-natural state as they host a wide range of flora and fauna. The Dhanauri wetland along with agricultural land supports a rich diversity of flora and fauna. Due to the ever-increasing pressure of urbanization, Indian wetland areas are shrinking fast. Besides this several anthropogenic activities increasingly pollute these valuable water bodies. We found that the distribution of Sarus crane depends upon the suitability of niche within the habitat..Our study indicates that Sarus Crane mostly prefers agricultural land around the Dhanauri wetland because it is found to be the least disturbed habitat protecting their nest as well as progeny from the predators during the breeding season. In the view of this finding, it can be suggested that regular monitoring of the Sarus Crane population and associated biological parameters (food, water and space) necessary for its survival would pave the way towards an effective conservation strategy.

ACKNOWLEDGMENTS

We are grateful to the CSIR, Council of Scientific & Industrial Research for providing financial support. The authors are also thankful to Kurukshetra University, Kurukshetra, for providing necessary facilities.

Authors' contribution: Both the authors conceived and designed the study. GH performed acquisition, integration and interpretation of data. Both the authors wrote the manuscript.

Conflict of interest: The authors declare that they do not have any conflict of interest.

REFERENCES

Ansari, N.A. 2015. Populaion Composition and distribution of Sarus Crane (*Grus antigone antigone*) in Gautumbudh Nagar, with special reference to Surajpur wetland National Capital Region, India. International Journal of plant, animal, and environmental sciences, 5(3): 41-46.

Aryal, A., Shrestha, T.K., Sen, D.S., Upreti, B. and Gautam, N. 2009. Conservation regime and local population ecology of Sarus Crane (*Grus antigone antigone*) in west-central region of Nepal. Journal of Wetlands Ecology, 3: 1–11. http://dx.doi.org/10.3126/jowe.v3i0.2224

BirdLife International. 2016. *Antigone antigone*. The IUCN Red List of Threatened Species 2016: e.T22692064 A93335364. https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22692064A93335364.en.

Block, W.M. and Brennan, L.A. 1993. The habitat concept in ornithology: theory and applications. Current Ornithology, 11:35–91.

Borad, C.K.; Mukherjee, A. and Parasharya, B.N. 2003. Nest site selection by the Indian Sarus Crane in the paddy crop agro ecosystem. Biological Conservation, 98: 89-96.

Borad, C.K., Mukherjee, A., Patel, S.B. and Parasharya, B.N. 2004. Breeding performance of Indian Sarus Cranes *Grus antigone* in the paddy crop agroecosystem. Biodiversity and Conservation, 11(5): 795–805. http://dx.doi.org/10.1023/A:1015367406200

Bullock, A. and Acreman, M. 2003. The role wetlands in the hydrological cycle. Hydrology and Earth Sytstem Sciences, 7(3): 358-389.

Canadas, A., Sagarminaga, R., De Stephanis, R., Urquiola, E. and Hammond, P.S. 2005. Habitat preference modelling as a conservation tool: proposals for marine protected areas for cetaceans in southern Spanish waters. Aquatic Conservation, 15(5):495–521.

Jha, K.K. 2013. Save UP wetlands to save flagship species sarus and in turn wetland biodiversity under the umbrella. Pages 17-29, In: Water and Biodiversity. Uttar Pradesh State Biodiversity Board, Lucknow.

Jones, J. 2001. Habitat selection studies in avian ecology: a critical review. Auk, 118(2):557–562.

Klar, N., Fernández, N., Kramer-Schadt, S., Herrmann, M., Trinzen, M., Büttner, I. and Niemitz, C. 2008. Habitat selection models for European wildcat conservation.

Biological Conservation, 141(1):308–319.
Meine, C.D. and Archibald, G.W. 1996. The Crane: Status, Survey and Conservation Action Plan. IUCN, Gland, Switzerland and Cambridge, UK. 282pp.
Morris, D.W. 2003. How can we apply theories of habitat selection to wildlife conservation and management? Wildlife Research, 30(4):303–319.
Sundar, K.S.G. and Subramanya, S. 2010. Bird use of rice fields in the Indian subcontinent. Waterbirds, 33: 44–70.
Sundar, K.S.G. 2011. Agricultural intensification, rainfall patterns, and large water bird breeding success in the extensively cultivated landscape of Uttar Pradesh, India. Biological Conservation, 144(12): 3055–3063. http://dx.doi.org/10.1016/j.biocon.2011.09.012.

Received: 17th December 2020
Accepted: 21st April 2021